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A NEW SPECIES OF *RHYACOPHILA* PICTET (TRICHOPTERA: RHYACOPHILIDAE) FROM GREAT SMOKY MOUNTAINS NATIONAL PARK, WITH ILLUSTRATIONS OF FEMALES OF *R. APPALACHIA* MORSE AND ROSS AND *R. MYCTA* ROSS

David A. Etnier, Charles R. Parker, and Ian C. Stocks

(DAE) Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, TN 37996-1610, U.S.A. (e-mail: dipnet@utk.edu); (CRP) United States Geological Survey, Biological Resources Discipline, Great Smoky Mountains National Park, Gatlinburg, TN 37738, U.S.A. (e-mail: chuck_parker@usgs.gov); (ICS) Research Associate, Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN 37996, U.S.A. (e-mail: istocks@charter.net)

Abstract.—***Rhyacophila celadon* Etnier, Stocks, and Parker, n. sp.**, a large species of the *R. nigrita* species group, is described from areas in Great Smoky Mountains National Park, Tennessee and North Carolina, based on males, females, and larvae. The male is virtually identical to that of *R. nigrita,* but differs consistently from that species in aspects of the genitalia. The female and larva differ remarkably from those of *R. nigrita.* Females of *Rhyacophila appalachia* and *R. mycta* are illustrated.

Key Words: Trichoptera, Rhyacophilidae, *Rhyacophila,* Great Smoky Mountains National Park, Tennessee, North Carolina

During June of 1996, Etnier and students began a study of benthic macroinvertebrates from nine localities in the Sams Creek watershed of the Middle Prong Little River system, Great Smoky Mountains National Park (GSMNP), near the boundary of Blount and Sevier counties, Tennessee. This study was in conjunction with an attempt to reclaim a portion of Sams Creek for native brook trout (*Salvelinus fontinalis* (Mitchill)). A light trap sample from Sams Creek about 200 m below the mouth of Starkey Creek, elevation 963 m, 6–7 June 1996, contained 3 males and 2 females of a species in the *Rhyacophila nigrita* subgroup of the *R. invaria* species group *sensu* Schmid (1970) or *R. nigrita* complex *sensu* Prather and Morse (2001). The collection included two additional species of the *R. nigrita* subgroup—1 male and 1 female of *R. nigrita* Banks and 34 males and 1 female of *R. appalachia* Morse and Ross. Based on male genitalia, the species in question was very similar to *R. acutiloba* Morse and Ross, a species described from New Hampshire and widespread in the Northeast, extending south to North Carolina. A large but uncommon *Rhyacophila* larva with glossy dark reddish brown head and thoracic sclerites, and strikingly bluegreen thoracic and abdominal membranous areas was also encountered in the Sams Creek study. The larva closely conformed to the description of *R. acutiloba* associated by Neves (1977) and described as *Rhyacophila* species 2 by Flint (1962), but lacked the pale areas on the posterior corners of the pronotum and posterior portion of the frontoclypeus. During February of 1997, ICS found this same larva to be more abundant in Alum Cave

Creek, also in GSMNP. That creek was sampled on 10 April 1997 to obtain pupae that would allow us to confirm the tentative larva/adult association. Adults from this collection began emerging on 25 April, and were identical to those collected earlier in Sams Creek. We examined a paratype male of *R. acutiloba,* and the differences we had noted between our specimens and the illustration of the male of that species (Morse and Ross 1971) were striking and consistent, indicating that we had discovered an undescribed species whose description follows.

Methods

Pupal cases were held with little mortality for several days in jars filled with stream water and kept cold in a cooler. At the laboratory we removed the pebble case under a dissecting microscope and transferred the pupal cases, one to three per jar, to loosely covered 4–8 oz jars with the pupae barely covered with water. The jars were placed in an incubator set to maintain temperature and daylength conditions similar to those from the pupal habitat. Mature pupae that emerged from the pupal capsule often failed to complete the final molt to winged adults, but the addition of a toothpick or other object as an emergence platform appeared to be helpful.

Rhyacophila celadon Etnier, Stocks, and Parker, new species

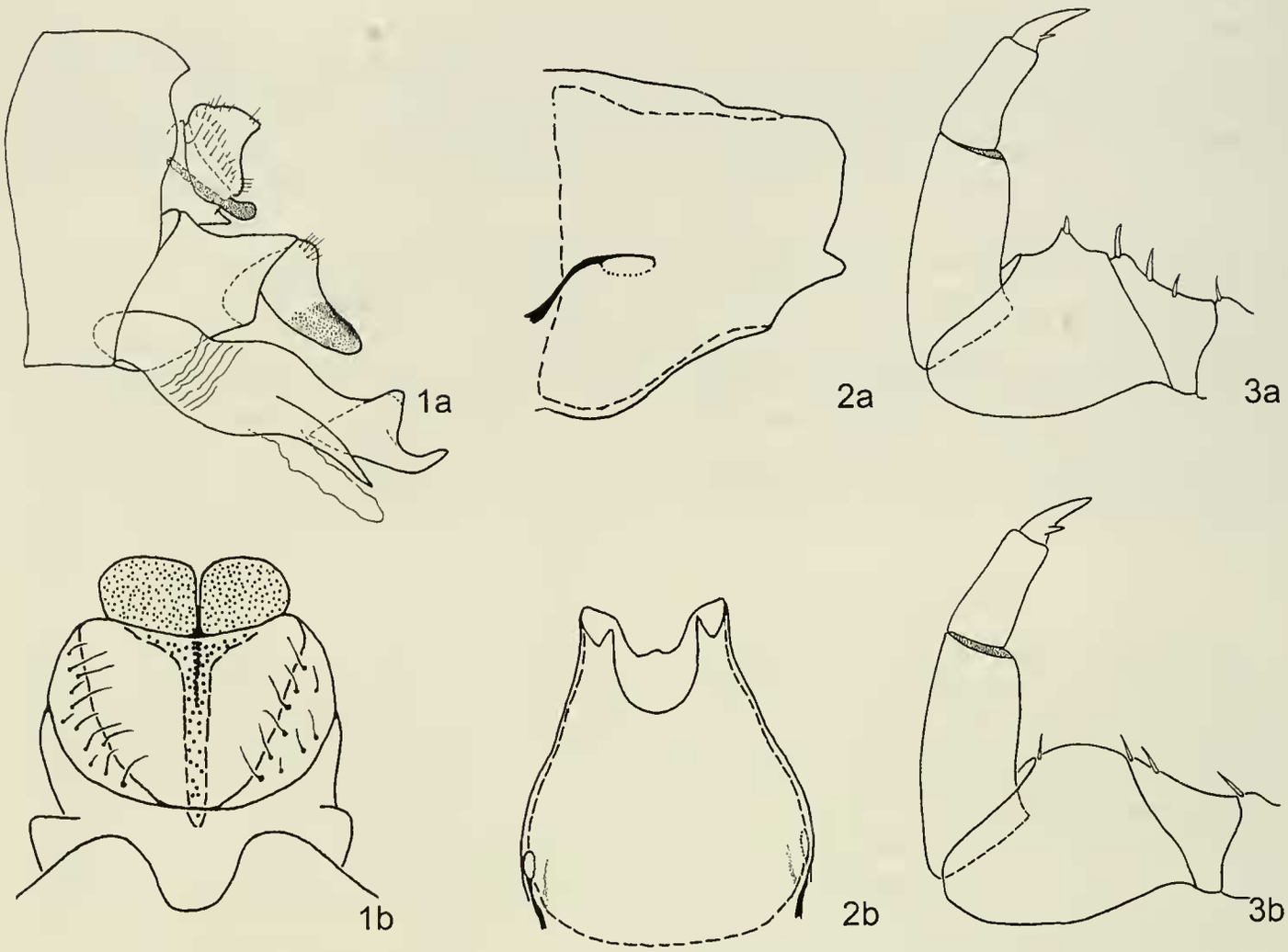
(Figs. 1–5, 9)

Rhyacophila appalachia: Prather and Morse 2001, fig. 40, ♀.

Types.—Holotype: Mature ♂ pupa, Alum Cave Creek ca. 500 m east of U.S. Highway 441 on Alum Cave Trail, GSMNP, Sevier County, Tennessee, collected 10 April 1997, emerged 25 April 1997, D. A. Etnier and I. A. Stocks, deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Allotype: Mature ♀ pupa, same data, emerged 29 April 1997 (USNM). Paratypes: Same data as holotype, Illinois Natural History Survey (INHS), mature ♂ pupa, emerged 25 April 1997, ♀, emerged 27 April 1997; Clemson University (CUAC), mature ♂ pupa, emerged 6 June 1997, mature ♀ pupa, emerged 27 April 1997; Royal Ontario Museum (ROM), mature ♂ pupa, emerged 27 April; University of Tennessee (UT) 1.840, ♀, emerged 30 April. Alum Cave Creek at footbridge at Alum Cave Trail trailhead, U.S. Highway 441, GSMNP, Sevier County, Tennessee, 10 April 1997: ROM, mature ♂ pupa, emerged 2 May 1997; UT 1.769, mature ♂ pupa, emerged 5 May, UT 1.770, mature ♀ pupa, emerged 12 May. Sams Creek, light trap at camping area (not designated) ca. 200 m below mouth of Starkey Creek, GSMNP, Sevier County, Tennessee, 6–7 June 1996, Ex UT 1.280, UT 18.27: California Academy of Sciences (CAS), ♂, ♀; University of Minnesota (UMSP), ♂, ♀; UT 1.280, ♂. Thunderhead Prong ca. 100 m below mouth of Sams Creek, GSMNP, Blount County, Tennessee, 7 June 1996, hand-picked, 1 ♂, UT 1.286. Clingmans Creek at pumphouse, elevation 1579 m, 3.9 km NE Forney Ridge Parking Lot, 35°33′36″N, 83°29′1″W, GSMNP, Swain County, North Carolina, 1–2 June 1989, UT 1.840, 2 ♀. Lights near Cosby Creek Ranger Station, elevation 533 m, 35°46′40″N, 83°12′49″W, GSMNP, Sevier County, Tennessee, 17 May 2001, CUAC, 1 ♀, ROM, 1 ♀. All mature pupae are metamorphotypes (MMT) accompanied by larval sclerites.

Additional material.—Alum Cave Creek at footbridge below Rock Step Cave Pass, Alum Cave Trail, GSMNP, Sevier County, Tennessee, 23 February 1997, Ex UT 1.315: USNM, 1 larva; INHS, 1 larva; UT 1.316, 5 larvae. Alum Cave Creek at second footbridge east of US 441, GSMNP, Sevier County, Tennessee, 2 March 2001, UT 1.764, 3 larvae, 1 prepupa. Alum Cave Creek ca. 3,500 m east of US 441, Sevier County, Tennessee, 29 February 2000, UT 1.774, 5 larvae.

Sams Creek system, GSMNP, Tennessee:



Figs. 1–3. *Rhyacophila celadon* male genitalia, 1a, lateral, left inferior appendage not shown; 1b, dorsal. *Rhyacophila celadon* female genitalia, 2a, lateral; 2b, ventral. *Rhyacophila* larval forefemora. 3a, *R. celadon*; 3b, *R. nigrita*.

Starkey Creek ca. 400 m above Sams Creek, Sevier County, 2 February 1997, Ex UT 1.321, 1 larva each to CUAC, ROM, and UMSP; UT 1.778, 1 larva. Starkey Creek immediately above Sams Creek, Sevier County, 6 June 1996, UT 1.779, 2 larvae. Sams Creek ca. 800 m above Starkey Creek, Blount County, 2 February 1997, UT 1.317, 1 larva; UT 1.319, 2 larvae. Sams Creek ca. 100 m below Churn Hollow, Sevier County, 1 February 1997, UT 1.309, 1 larva; UT 1.311, 3 larvae + 1 larva to CAS. Thunderhead Prong ca. 100 m below Sams Creek, Blount County, 7 June 1996, UT 1.293, 1 larva. Eastern tributary (seep) to Sams Creek about halfway between Devils Bench Branch and Churn Hollow, Sevier County, 7 September 1996, UT 1.780, 1 larva.

Road Prong ca. 3.2 km below Indian Gap, GSMNP, Sevier County, Tennessee, 16 May 1975, UT 1.772, 2 mature ♀ pupae, 1 larva.

Oconaluftee River along U.S. Highway 411 ca. 16 km south of Tennessee border, Swain County, North Carolina, 9 March 1997, UT 1.320, 1 larva.

Diagnosis.—Based on morphological characters of males, females, and larvae, *Rhyacophila celadon* is a member of the *Rhyacophila invaria* group diagnosed by Schmid (1970). Within the *R. invaria* group, *R. celadon* is a member of the *R. nigrita* complex (*R. accola* Flint, *R. acutiloba, R. appalachia, R. carpenteri* Milne, *R. mycta* Ross, *R. nigrita*).

The male differs from *R. appalachia* and *R. carpenteri* in having the tenth tergite (Fig. 1a) rectangular to subrectangular in lateral view. It differs from *R. accola* in

lacking the deep, C-shaped emargination in the sclerotized tip of the phallus (Fig. 1a) and in having the ninth tergite tapering to its mesal emargination (Fig. 1b) rather than truncate on either side of the emargination in *R. accola*. It differs from *R. mycta* in the much smaller distal end of the anal sclerite, in lacking a dorsal swelling near the distal margin of tergite IX, and in lacking a distinct dorsal lobe on the distal segment of the inferior appendages. It is most similar to *R. acutiloba* and *R. nigrita*. It differs from the former in having the lobes of the anal sclerite bluntly rounded (Fig. 1b) rather than laterally produced into a blunt but acute point in *R. acutiloba*. It differs consistently from *R. nigrita* in having the crest of tergum X with only its dorsal fourth separated from the posterior end of segment IX (entire anterior margin of crest of X separated from IX in *R. nigrita*), and in having the anal sclerite long and straight in lateral view, and extending forward to near or slightly within segment IX (not even extending completely under the crest of X, and decurved posteriad in *R. nigrita*). The dorsal margin of the tenth tergite is usually slightly convex (Fig. 1a) versus usually slightly concave in *R. nigrita*. The sclerotized paired dorsal lobes near the tip of the phallus are smoothly pointed in *R. celadon* (Fig. 1a), but more rounded and often with a ventral swelling in *R. nigrita*.

The female (Fig. 2) differs from *R. fuscula* (Walker) and from *R. accola*, *R. acutiloba* (see Ruiter 2000), *R. carpenteri*, *R. invaria* (Walker), *R. mycta*, *R. nigrita*, and *R. parantra* Ross of the *R. invaria* group in having both dorsal and ventral posterior margins of segment VIII deeply and broadly emarginate. It differs from *R. alabama* Harris, *R. appalachia*, and *R. banksi* Ross in lacking paired projections on the posterior ventral margin of segment VIII. It differs from *R. carolae* Harris, *R. kondratieffi* Parker, and *R. shenandoahensis* Flint in lacking a long median projection on the ventral emargination of segment VIII. It differs from *R. vibox* Milne in having the ventral emargination of segment VIII smoothly rounded (doubly emarginate in *R. vibox*) and in having the dorsal emargination with a short median projection (smoothly rounded in *R. vibox*). The female of *R. tricornuta*, also in the *R. invaria* group, is unknown.

The larva (Fig. 3a) differs from all other *R. nigrita* group larvae in having seta 5 (Williams and Wiggins 1981) of the forefemur situated on a prominent, bluntly pointed protuberance.

Description.—*Male:* Length 12.2–13.5 mm, forewing length 11.4–12.0 mm (N = 4). Forewing dark brown with stigmatic area and a band centered on vein R_1 and about width of R_1-Sc interspace darker brown. Transparent spot present just proximal to basal fork of vein M, and extending to fork and on anterior half of crossvein m-cu. Head and thorax dark brown, legs yellowish brown with dark brown tibial spurs, spur formula 3-4-4. Abdomen with tiny ventromedian spine near posterior margin of segment VII. Segment IX, in lateral view (Fig. 1a) with dorsal margin smoothly convex and posterior margin smoothly concave from posterior dorsal projection to connection with tergite X. Posterior dorsal projection of IX (dorsal view, Fig. 1b) forming an angle of about 80°, and with a U-shaped mesal emargination. Tergite X, lateral view, subrectangular, but appearing distinctly triangular in cleared specimens due to approximate 45° angle of its posterior concavity or groove. Bottom of concavity or groove extends from anterior dorsal to posterior ventral extent of tergite X, and areas posterior and dorsal to this "line" form a darkened triangle due to additional sclerotized surfaces (sides of concavity) light must pass through. Anal sclerites (lateral view) straight, with posterior ends slightly inflated, and with stem extending anteriad to or slightly past posterior margin of IX. Anal sclerites bluntly rounded in dorsal view. Inferior appendages with distal segment slipper-shaped, dorsal lobe scarcely differentiated. Phallic apparatus with paired

membranous ventral lobes and sclerotized, pointed, nearly straight parameres. Aedeagus sclerotized, with upturned ventral tip (Fig. 1a) and nearly triangular basal lobes.

Female: Length 12.8–14.5 mm, forewing length 11.0–13.0 mm (N = 7). Head, eye size, thorax, wing color, legs, and tibial spur counts as in male. Small median ventral spine on posterior margin of segment VI. Abdominal segment VIII with short posterior spine laterally in middle of ventral half of segment (Fig. 2a). Segment VIII dorsally with W-shaped emargination, and ventrally with broad, deep, smoothly rounded U-shaped emargination (Fig. 2b).

Pupa: Pupal cases in preservative ranged from 12.3 to 16.6 mm (N = 11).

Larva: Last instar larva 18 to 27 mm long (N = 19, mean = 21.5). In life, head and pronotum shiny dark reddish brown; membranous areas a brilliant bluegreen (Fig. 4). Head (Fig. 5) parallel sided in dorsal view, 2.4 mm long to anterior margin of frontoclypeus, 1.0 mm wide, with pale circle around eye and paler at posterior margin. Pale muscle scars more conspicuous on molted larval sclerites than on larvae, forming a transverse band of about 10 muscle scars in 2 poorly defined rows, concave anteriad, across base of triangular portion of frontoclypeus. Genae with prominent dorsal, lateral, and ventral groupings of muscle scars, all of which extend from rear of sclerite anteriad to level of band of muscle scars on frontoclypeus. Dorsal muscle scars about 25, arranged in 3 rows posteriad, one row extending anteriad, with a distinct gap between 1 or 2 anterior muscle scars and remainder of row. Lateral muscle scars about 45, arranged in 4 rows posteriad and 3 rows anteriad. Ventral muscle scars about 20–25, arranged in 2 rows posteriad, and 1 row anteriad. In all three groups of muscle scars on genae, posterior ones are difficult to see against pale background. Right mandible with 3 apical teeth, middle tooth longest, dorsal tooth shortest. Left mandible with 2 apical teeth, dorsal tooth half as long as ventral tooth. Maxillary palp with second segment slightly longer than combined third and fourth segments. Pronotum concolorous, slightly less dark than head, with an arc of 7–10 ten small muscle scars anteriad, concave laterad, and about 25 larger ones posteriad in 6 rows at posterior margin, with only 3 rows extending anteriad to middle of sclerite. About 5 additional muscle scars along mesal margin on posterior half of sclerite. Legs brownish yellow, foreleg slightly darker and much thicker than other legs. Forefemur highly modified (Fig. 3a), with anterior margin forming a sharp edge, and midway with a bluntly pointed protuberance bearing a short, stout seta. Foretrochanter with anterior margin concave and bearing 3 short, stout setae, one proximal, one subdistal, and one distal. Anteriodistal end of foretrochanter not extending as far forward as base of femur, thus forming a distinct notch [anterior margin of femur and trochanter of foreleg forming a straight line, femur lacking a protuberance, and trochanter very slightly concave in larvae of *R. appalachia, R. banksi, R. mycta, R. nigrita* (Fig. 3b), *R. parantra,* and *R. vibox*]. In six earlier instar larvae of *R. celadon* (6.5–16.5 mm), foretrochanter distinctly concave anteriad, notch between trochanter and base of femur apparent, and forward projecting tubercle on femur developed or anterior margin of femur sharply and acutely pointed. Membranous areas of thorax and abdomen strikingly bluegreen (Fig. 4), this color disappearing in preservative. Anal claw not strongly curved, and with two teeth, proximal one tiny and often difficult to see; a long seta arising from a slightly elevated protuberance proximal to suture in middle of anal claw.

Biology.—Some larvae reach final instar in early February. In the laboratory, mature pupae emerged from their pupal case from 25 April through 6 June. Adults have been taken from 17 May through 7 June. Two larvae 8.0–8.5 mm long, collected on 2 February, and two larvae 16.5–18 mm long, from 6 June, suggest that emergence dates extend well into June, and probably into

Fig. 4. *Rhyacophila celadon*, last instar larva, dorsal.

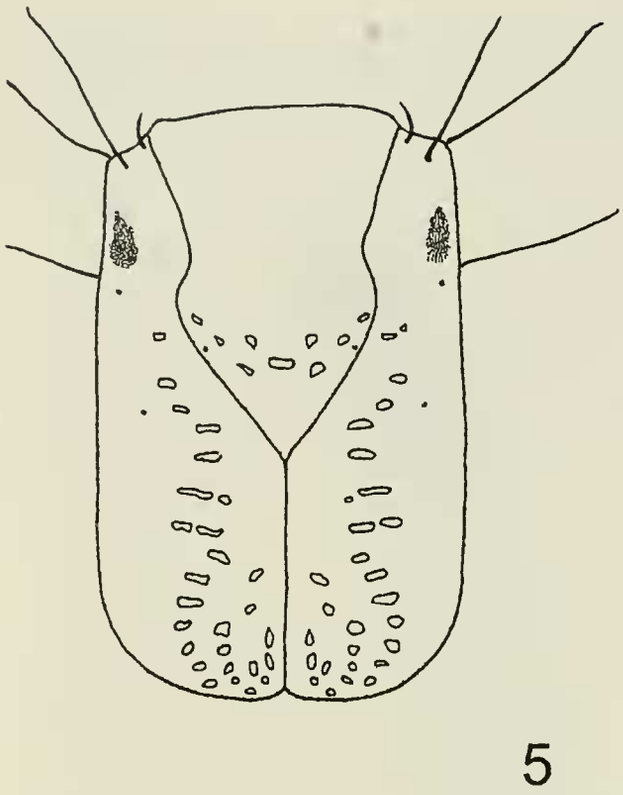


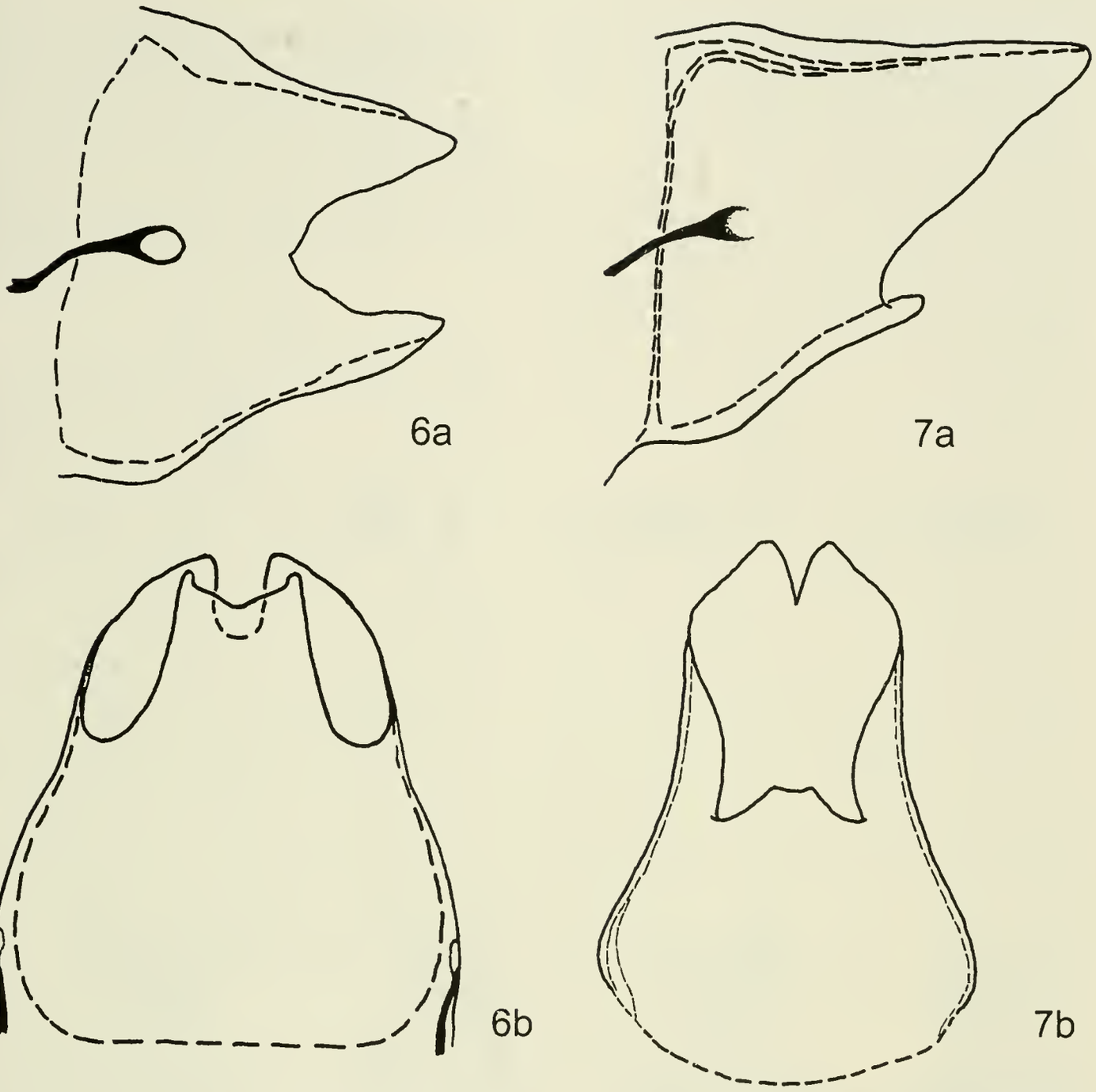
Fig. 5. *Rhyacophila celadon,* last instar larva, head, dorsal.

July. We have taken this species from cool first through third order streams at elevations of 533 m (1,749 ft, Cosby Creek Ranger Station) to about 1,280 m (4,200 ft, upper Sams Creek and Road Prong). The two seeps sampled during the Sams Creek investigation produced numerous larvae of *R. appalachia/nigrita,* but only one larva of *R. celadon* (UT 1.780).

Etymology.—Celadon is a Korean ceramic pottery noted for its bluegreen glaze, similar to the strikingly bluegreen membranous areas of live larvae of this species.

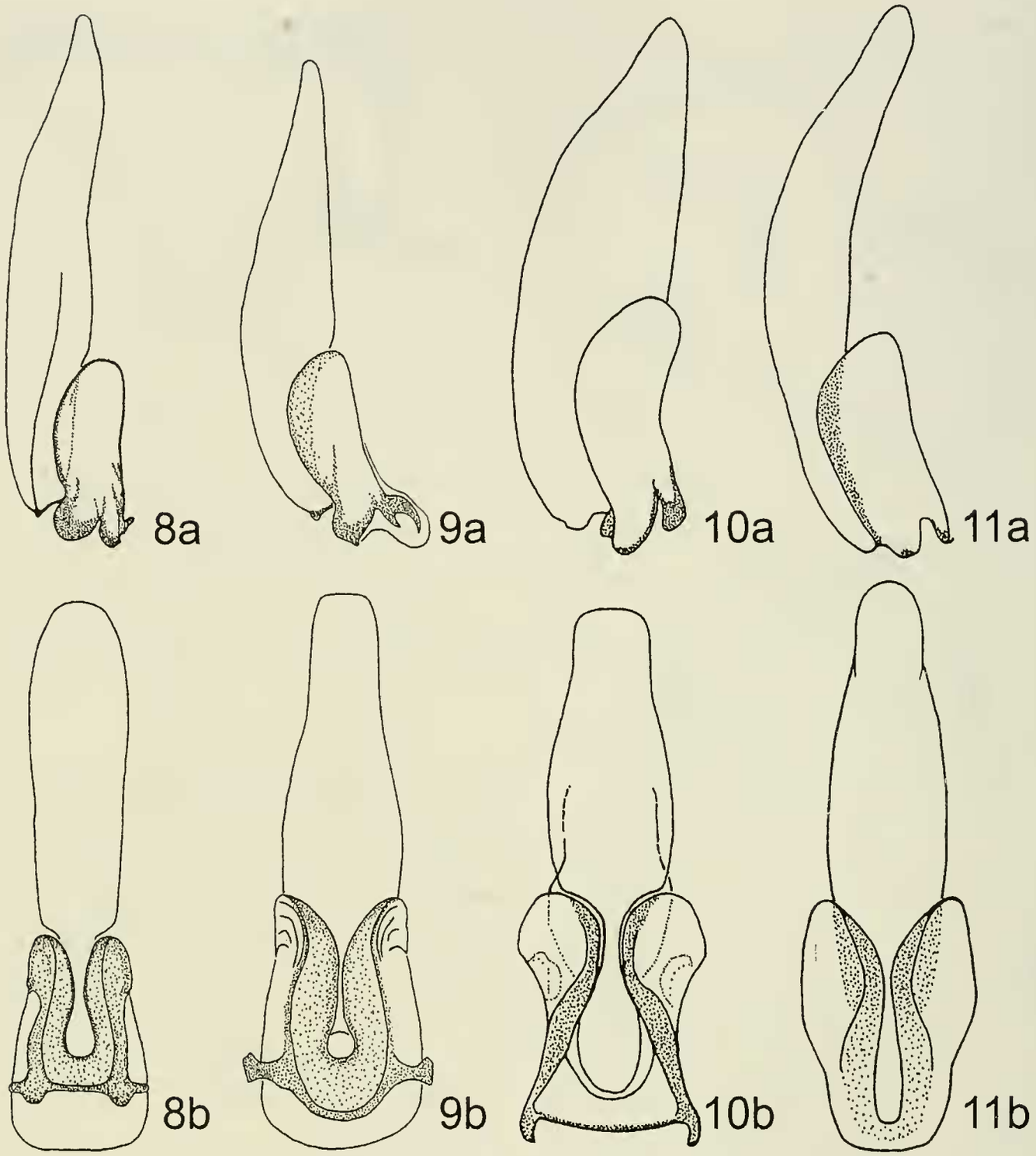
Discussion.—Initially we were surprised that this large, fairly common species of *Rhyacophila* with such an attractive larva could have gone so long undescribed. In preparing the diagnoses, it soon became obvious that the male was so similar to *R. nigrita,* especially in genitalia characters, that it might seem prudent to accept the differences as being intraspecific variation (see Prather and Morse 2001). Finding adults (Sams Creek) and metamorphotypes (Road Prong) sympatric with those of *R. nigrita* strongly suggested that two species were involved. Associating the female of *R. celadon,* with segment VIII trenchantly different from that of *R. nigrita* and all known females of the *R. invaria* group, convinced us of its species level status. It was gratifying to find diagnostic morphological differences in the larval forefemur, in addition to less reliable differences in pigmentation. Examination of larval sclerites of numerous metamorphotypes of the sympatric *R. appalachia* and *R. nigrita* suggests that the reduced number of muscle scars on the head may offer reliable characters to separate these two species from *R. celadon.* In contrast, we find less darkly pigmented specimens of *R. appalachia,* prevalent in GSMNP, to be inseparable from larvae of sympatric *R. nigrita.* The spinelike supports on the anterior margin of the pronotum (easily counted in shed larval sclerites) may offer an additional character for separating larvae in the *R. invaria* species group. They number over 20 per sclerite in *R. celadon,* about 15–20 in *R. appalachia* and *R. nigrita,* and only 10–13 in *R. banksi, R. invaria,* and *R. parantra.*

The Prather and Morse (2001, fig. 40) illustration of the female of *Rhyacophila appalachia* is actually that of *R. celadon,* with dorsal and ventral views reversed. This illustration is presumably based on one or more of four females from Mount Sterling Creek at State Highway 284, elevation 1,057 m, GSMNP, Haywood County, North Carolina, 22 May 1996, housed at UMSP. We base our identification of the female of *R. celadon* on metamorphotype females, in which larval forefemora clearly have the diagnostic seta-bearing tubercle of *R. celadon.* The female they suspected to be that of *R. mycta* (fig. 60) we consider to be the female of *R. appalachia,* based on metamorphotype females taken syntopically with metamorphotype males, and adult males and females taken together in a light trap with males and females of both *R. celadon* and *R. nigrita.* We provide an additional ventral and lateral view of segment VIII for female *R. appalachia* (Fig. 6).



Figs. 6–7. *Rhyacophila* female genitalia. a, lateral; b, ventral. 6, *Rhyacophila appalachia*. 7, *Rhyacophila mycta*.

Based on the following, we consider Fig. 7 to represent the female of *R. mycta*. We have males of *R. mycta* from two widely separated GSMNP localities (near LeConte Creek, TN, 603 m, and at Andrews Bald, NC, 1,767 m) associated with females similar to the one illustrated in Fig. 7, as well as mature female pupae from the bog at Andrews Bald. The female of *R. mycta* is very similar to that of *R. nigrita*, differing in having the dorsal apex of VIII emarginate, the lateral margin with a low but distinct projection near its midlength, the ventral margin slightly to strongly produced medially, and the vaginal sclerites shorter and stouter than in *R. nigrita* (Figs. 10, 11). For comparison, we also have included ventral and lateral views of the vaginal sclerites of *R. appalachia* and *R. celadon* (Figs. 8–9). Females of *R. nigrita* in which the dorsal margin of VIII is notched have been noted and regarded as variants of *R. nigrita* (Prather and Morse 2001). In addition, we have a female we believe to be *R. mycta* which lacks the dorsal emargination of VIII, but otherwise possesses the characters



Figs. 8–11. Vaginal sclerites of *Rhyacophila* females. a, lateral; b, ventral. 8, *R. appalachia.* 9, *R. celadon.* 10, *R. mycta.* 11, *R. nigrita.*

described above. Females such as these may be very difficult to assign to either *R. mycta* or *R. nigrita.* A closer examination of associated series of both species is called for. We have noted considerable intraspecific variation in the shape of segment VIII in females, including in *R. appalachia,* where the posterior dorsal emargination varies in depth, and from U-shaped to V-shaped; the ventral emargination may have a broad, shallow, median projection, and the lateral borders of the emargination may be parallel to divergent. Females of *R. appalachia* and *R. mycta* have been sent to USNM, INHS, CUAC, and UMSP.

The virtually identical male genitalia of several members of the *R. invaria* species group (*R. celadon/R. nigrita, R. banksi/R. parantra*) which are easily separable as females, and the presence of "unusual" *R.*

invaria group females we have seen suggest that additional valid but undescribed species in the *R. invaria* group exist.

Prather and Morse (2001) provide keys to males, females, and larvae of the Eastern Nearctic *Rhyacophila*. To accomodate *R. celadon*, we present the following changes and additional couplets.

Key to Males

R. celadon males should key to couplet 18 in Prather and Morse, which can be replaced by the following:

18(16′) Segment X quadrate in lateral view, with high rectangular to subrectangular crest; anal sclerites large, wide in dorsal view 18a

18′ Segment X not quadrate, with low, somewhat flattened crest; anal sclerites small, narrow in dorsal view . . . . . *R. appalachia*

18a(18) Crest of X free of posterior edge of segment IX for only apical fourth of its height, dorsal margin of crest usually slightly convex; anal sclerite with long root originating near anterior of X, nearly in IX. Forewing length 11–12 mm . . . . . *R. celadon*

18a′ Crest of X nearly entirely free of posterior edge of segment IX, dorsal margin usually slightly concave; anal sclerite with short root, originating near midlength of X. Forewing length less than 10 mm . . . . . *R. nigrita*

Females of all of the species discussed in this paper are keyed in Prather and Morse with the exception of *R. mycta*, although two are misidentified. In couplet 25′, replace *R. mycta* with *R. appalachia*. In couplet 29′, replace *R. appalachia* with *R. celadon*. *R. mycta* is accommodated by the following modifications to couplets 17–19.

17(11′) Dorsal margin extending posteriorly much farther than ventral margin, with lateral margin rising from venter to dorsum at nearly 45° angle 17a

17′ Dorsal margin not extending posteriorly farther than ventral margin, often not extending as far posteriorly as ventral margin 18

17a(17) Posterodorsal margin with mesal projection, rarely emarginate . . . . . *R. nigrita*

17a′ Posterodorsal margin emarginate, rarely with mesal projection . . . . . *R. mycta*

18(17′) Posterodorsally with mesal projection 19

18′ Posterodorsally emarginate or notched 20

19(18) Posteroventrally with mesal projection . . . . . *R. carpenteri*

– Posteroventrally emarginate . . . . *R. fuscula*

The larva of *R. celadon* will key to *R. nigrita* in existing keys to *Rhyacophila* larvae, including Prather and Morse. However, the diagnostic seta-bearing tubercle of *R. celadon* is so highly distinctive that larvae of this species should be easily distinguishable.

Other Material Examined

Rhyacophila appalachia: UT 1.244, 1 ♀, Ripshin Bog, Carter Co., TN, 29 May 1995; UT 1.771, 1 ♀, Sams Creek 200 m below mouth of Starkey Creek, GSMNP, Sevier County, Tennessee, 6–7 June 1996 + 34 ♂, same data, in UT 1.279; UT 1.552, 2 ♀, Thunderhead Prong 100 m below mouth of Sams Creek, GSMNP, Blount Co., TN, 7 June 1996 (1 ♀ to USNM); UT 1.732, 1 MMT ♂, 2 MMT ♀, creek on east side of State Highway 66, 0.7 road miles north of Brown Mountain Road, Stokes Co., NC, 14 April 2001 (1 ♀ to CUAC); UT 1.737, 4 MMT ♂, 4 MMT ♀, creek at Cove Road/Rough Creek Road junction, 1.7 road miles above Suttontown Road, Haywood Co., NC, 28 April 2001 (1 ♀ to INHS, 1 ♀ to UMSP).

Rhyacophila mycta: Andrews Bald, acid bog area, elevation 1757 m, GSMNP, Swain Co., NC, Malaise trap, 24 May–6 June 2001, UT 1.845, 3 ♂, 1 ♀; same data, 10 May–19 June 2002, 1 ♂ and 1 ♀ each to CUAC, INHS, and UMSP; same data, hand picked from bog and seeps, 11 June 1991, UT 1.844, 3 ♀ pupae, 1 prepupa. Spring seep behind Twin Creeks Laboratory, GSMNP, near LeConte Creek, Sevier Co., TN, 29 May 1998 sweep netting, 1 ♂; same data, 15 August 1997, 1 ♂, 1 ♀ (to USNM).

Rhyacophila nigrita: larval foreleg drawn from UT 1.224, 1 MMT ♂, 1 pupa, 2 larvae, Matthew Creek 2.25 air km above its mouth, Sevier Co., TN, 7 June 1994; female vaginal sclerites drawn from specimen

collected Surry Fork, ca. 100 m upstream of confluence with Roaring Fork, 35°41′24″N, 83°27′29″W, GSMNP, Sevier Co., TN, 8 June 1989.

Acknowledgments

Kathy R. Zeiders of the Illinois Natural History Survey kindly provided a paratype male of *Rhyacophila acutiloba* for our examination. Elizabeth L. Etnier easily won the "name that insect" contest with her suggestion of the species epithet *celadon*. Discover Life in America, the organization directing the All Taxa Biodiversity Inventory for GSMNP, generously assumed a portion of the cost of publishing the Richard T. Bryant color photo of the larva of *R. celadon*. Brian Scholtens provided the Cosby Creek female paratypes.

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